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casual care. For therein we specifically stated that notwithstanding the fact that we could find no comprehensive treatise on this phenomenon in the sources at our command, still we had the impression that very thorough observations have long since been made and recorded, but felt justified in recording our observations in order to *recall* attention to the phenomenon. So, notwithstanding Dr. Auer's conviction to the contrary, I still hold that the material contained in our communication is not original.

Finally, had Dr. Auer made careful observations upon the frog's pupil he would have found that excision of the eye or stoppage of the frog's circulation, as by removing or tying off the heart, are alone followed by very marked asphyxial constriction of the pupil, and therefore the employment of additional asphyxial procedures is entirely superfluous. His conclusion might then well have been *that asphyxial changes in a frog's pupil differ from those in mammals in that there is not such a well-marked period of asphyxial pupillary dilatation*. It should be observed that we pointed out in our note that the post-mortem condition of the pupil in different mammals varies: in cats it is chiefly dilatation; in common gray rabbits constriction (as compared with the size of the normal pupil in diffuse daylight). From this it is obvious that the asphyxial changes in the frog's pupil as compared with those of the rabbit are in general similar, the chief difference being a well-marked but short period of dilatation in the rabbit.

C. C. GUTHRIE

PHYSIOLOGICAL LABORATORY,
UNIVERSITY OF PITTSBURGH

QUOTATIONS

"MEDICAL FREEDOM"

MAKERS of patent medicines, adulterators of drugs, and practitioners of the cults of mental and osteopathic healing are up in arms. They have persuaded a few well-intentioned but misled individuals to join them, and have formed the "National League for Medical Freedom" to oppose the efforts of practically

all the reputable physicians in the country to consolidate the agencies of public health at Washington into one efficient department or bureau.

These efforts have been waxing stronger. The men of the American Medical Association and of the Committee of One Hundred on National Health, sanctioned by the Association for the Advancement of Science and headed by Professor Irving Fisher, of Yale, have won the approval of the entire press of the United States in urging the passage of their bill. In the various departments and bureaus of the federal government are lodged powers that can not be wielded effectively until they shall be coordinated under one head. Once united, they can be used in a great propaganda for educating the people against the habit of self-dosage and a resort to quack medicines for their ailments. By a campaign of prevention the bureau would break the prevalence of epidemics and infections between the states. It would work for the passage of laws that would guard the channels of inter-state commerce against the admission of adulterated drugs, and for the establishment of standards of purity and strength that would be copied by the states and cities of the nation.

The self-styled "League for Medical Freedom" quotes Professor Fisher accusingly as having said that the government might soon be appropriating millions yearly for the conduct of this bureau. If it should appropriate a million for every hundred thousand it now appropriates for the protection of the health of hogs and cattle in the United States, Professor Fisher's prophecy would be fulfilled, and no one would have cause for complaint but these friends of "freedom." Their cry is an old one and well understood.

License they mean, when liberty they cry.—
The N. Y. Times.

SCIENTIFIC BOOKS

Ants. Their Structure, Development and Behavior. By WILLIAM MORTON WHEELER. New York, Columbia University Press, Macmillan Co., publishers. 1910.

One need not be very old to recall the time when ants were the most neglected of American Hymenoptera. I remember receiving a letter from Dr. W. H. Ashmead, some twenty years ago, in which he urged me to take up the study of ants. The necessary literature he said was not voluminous, material was easily obtained—he himself could supply a large series of species from Florida—and the field was a new and fertile one. Doubtless he urged others in the same manner, always without success. A few American students did a little in a desultory sort of way, but the real authorities on our ants were Europeans, Emery and Forel. Wasps, bees, ichneumons, sawflies, all were being studied and described with zeal; but as for the ants, probably some thought them too difficult, while others supposed they were sufficiently known, and for one reason or another nobody would have anything to do with them.

Although this apathy might well have been regretted then, it is impossible to regret it now. The foundations of American myrmecology had indeed been laid by the Europeans, but the building itself was destined to be erected, in the fullness of time, by an American. Dr. Wheeler published his first contributions to the subject in 1900, and it was at once apparent that the ants had come to their own. Since then he has labored incessantly, issuing several important papers every year, and now a large volume discussing every aspect of the life and structure of his favorites.

It is probably not too much to say that Dr. Wheeler's "Ants" is the best book on entomology ever published in this country. In a certain sense, the general text-books of several eminent authors are much more comprehensive; a mere treatise on ants seems a very limited affair, dealing with merely a fraction of a single order. This *a priori* judgment is quickly dispelled on reading the book. Here we have morphology, anatomy, embryology, psychology, physiology, sociology, paleontology, zoogeography, taxonomy and even philosophy dealt with in an illuminating manner! The ant is presented to us as the hub of the

universe, and if there is any biological subject which may not be suggested by the study of myrmecology, it is probably of small consequence. No other entomological author has been in a position to give us a work at once so comprehensive and so critically written. Those who have produced admirable revisions of particular groups, have usually known little about development or habits, and have not so much as seemed aware that their subjects had a past. Those who have tried to cover the whole field, or a large part of it, have been obliged to compile much that could not be critically digested, no man being an expert in the whole of entomology. Such a work as the present may be taken to represent an optimum between two extremes, combining breadth with depth, neither being sacrificed to the other, while all is presented in a lucid and entertaining manner.

It is a model exponent of the new biology, of a method which will, we hope, eventually become as common as it is now rare. It is impossible to give any summary of the contents. Very interesting chapters are those on polymorphism, on harvesting and fungus-growing ants, on the extraordinary honey-ants, on the slave-makers of various kinds, and on the numerous insects of different orders living in the nests of ants. The chapters on sensation, instinct and "plastic behavior" constitute a little treatise on psychology.

Dr. Wheeler remarks that three different views may be entertained concerning the behavior of ants: "First, it may be said that ants not only have images or ideas as the result of sensory stimulation, but are able to recall them at will, and to refer them to the past. This would imply that ants, like man, not only have memory, but also recollection. Second, it may be maintained that ants have images only as the result of sensory stimulation, but are unable to call them up at will, much less to refer them to the absent or the past. This would imply that the insects have sensory association, but not recollection. Third, it may be maintained that ants are unable to form images or ideas and are hence

devoid of memory." The third view is said to be wholly untenable, and the second is considered "far and away the most plausible." However, on an earlier page Forel is quoted to the effect that *Polyergus*, after plundering a nest, appears to remember whether any pupæ were left, and in that case returns for them: "memory alone, *i. e.*, the recollection that many pupæ still remain behind in the plundered nest, can induce them to return." This seems to imply the first of the three alternatives, unless we hold that departure from an empty nest discharges a psychological state which would otherwise act as a stimulus to return. At all events, Dr. Wheeler has little sympathy with the purely mechanical interpretation of insect behavior. "I have unintentionally sat on nests of *Vespa germanica* and *Pogonomyrmex barbatus*," he remarks, "and while I have no doubt that I myself acted reflexly under the circumstances, it will take quite an army of physiologists to convince me that these creatures were acting as nothing but reflex machines."

At the end of the chapter on the degenerate slave-makers there is a bit of sociology which is worth quoting:

The zoologist, as such, is not concerned with the ethical and sociological aspects of parasitism, but the series of ants we have been considering in this and the four preceding chapters can not fail to arrest the attention of those to whom a knowledge of the paragon of social animals is after all one of the chief aims of existence. He who without prejudice studies the history of mankind will note that many organizations that thrive on the capital accumulated by other members of the community, without an adequate return in productive labor, bear a significant resemblance to many of the social parasites among ants. This resemblance has been studied by sociologists, who have also been able to point to detailed coincidences and analogies between human and animal parasitism in general. Space and the character of this work, of course, forbid a consideration of the various parasitic or semi-parasitic institutions and organizations—social, political, ecclesiastical and criminal—that have at their inception timidly struggled for adoption and support, and, after having obtained these, have grown great and insolent, only to degenerate into nuisances from

which the sane and productive members of the community have the greatest difficulty in freeing themselves.

Not many adverse criticisms occur to one and these relate only to minor details. I have found some practical inconvenience from a lack of connection between the illustrations and the text. In some cases the illustrations (*e. g.*, those of *Leptanilla* on p. 262) arouse a lively curiosity, and one is disappointed not to find anywhere in the book a suitable explanation of the peculiarities figured. There are some slight errors and misprints, mostly of little consequence; I venture to remark that the bee cited on p. 209 is *Ceratina nanula*, not *nana*. It is rather discouraging to find two figures of *Cremastogaster* nests built round coccids, and not even the genus of the coccid given.

In the chapter on fossil ants, there is a curious quotation from Emery which refers to the ants of Sicilian amber as indicating the condition of things "at the beginning of the Tertiary," and assumes that the Sicilian and Prussian ambers were contemporaneous. As is properly stated on another page, the Sicilian amber is very much later than the Prussian, and neither belongs to the earlier part of the Tertiary. None of the European localities for fossil ants seem to be older than Oligocene, but the American Green River beds are now known to be Eocene, and the two species indicated therefrom by Scudder are apparently the oldest known ants. There is on p. 162 a reference (which I have not followed up) to ants in the amber of Nantucket, "which is attributed to the Tertiary." This should certainly be looked into, as there is a possibility that the amber referred to may be of Cretaceous age.

There are some very useful appendices: (A) Methods of Collecting, Mounting and Studying Ants; (B) Key to the North American forms, down to the subgenera; (C) Complete list of North American (north of Mexico) Ants, with localities; (D) Methods of Destroying Ants, and (E) a voluminous (though still incomplete!) Bibliography.

T. D. A. COCKERELL